

Claims

1. A security document (1) with a security element (2, 3), characterized in that the security element (2, 3) consists at least partly of a material (*M*) that is optically changeable by an electric field (*E*) or magnetic field.

2. A security document according to claim 1, characterized in that the optically changeable material (*M*) includes a plurality of particles (8, 9) that are changeable in their position and/or alignment by means of an electric field (*E*) or magnetic field.

3. A security document according to claim 1 or 2, characterized in that the security element (3) includes information (3) applied to the security document (1) and consisting at least partly of the optically changeable material (*M*).

4. A security document according to any of claims 1 to 3, characterized in that the security element (2) includes a security layer (2) consisting at least partly of the optically changeable material (*M*).

5. A security document according to claim 4, characterized in that the security layer has a structure.

6. A security document according to any of claims 3 to 5, characterized in that the security layer (2) and/or the optically changeable information (3) has different colors in dependence on an electric field (*E*) or magnetic field from a certain viewing side.

7. A security document according to any of claims 3 to 6, characterized in that the security layer (2) and/or the optically changeable information (3) is transparent or opaque in dependence on an electric field (*E*).

8. A security document according to any of claims 4 to 7, characterized in that information to be protected is applied to a security layer.

9. A security document according to any of claims 4 to 8, characterized in that a security layer (2) covers information (10) applied to the security document (1).

10. A security document according to any of claims 1 to 9, characterized by an at least partly electrically conductive layer (11, 12) for applying and/or shielding an electric field.

11. A security document according to claim 10, characterized in that the electrically conductive layer has a structure.

12. A security document according to claim 10 or 11, characterized in that at least two conductive layers (11, 12) are connected conductively via a circuit (13).

13. A security document according to claim 11, characterized in that the circuit (13) includes a switchover unit formed so as to switch a conductive connection to a nonconductive state or vice-versa only after receiving a security code.

14. A security document according to any of claims 1 to 13, characterized in that the material is adapted to be brought by irradiation of light into a state in which it is optically changeable by an electric field.

15. A security document according to any of claims 2 to 14, characterized in that the particles of optically changeable material are embedded in a substance that produces an electric field upon irradiation of light.

16. A security document according to any of claims 1 to 15, characterized by a layer that produces an electric field upon irradiation of light.

17. A security document according to any of claims 1 to 16, characterized in that the optically changeable material is soluble by organic media and/or water.

18. A method for producing a security document (1) with a security element (2, 3), characterized in that the security element (2, 3) is produced using a material ( $M$ ) that is optically changeable by an electric field ( $E$ ) or magnetic field.

19. A method according to claim 18, characterized in that the optically changeable material ( $M$ ) includes a plurality of particles (8, 9) that are changeable in their position and/or alignment by means of an electric field ( $E$ ) or magnetic field.

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20. A method according to claim 19, characterized in that for producing the optically changeable material (*M*) the particles (8, 9) are incorporated in an ink or toner as pigments.

21. A method according to any of claims 18 to 20, characterized in that the security element (3) applied to the security document (1) using the optically changeable material (*M*) is information (3).

22. A method according to any of claims 18 to 21, characterized in that the security element (2) applied to the security document (1) using the optically changeable material (*M*) is a security layer (2).

23. A method according to any of claims 19 to 22, characterized in that for producing the optically changeable material (*M*) the particles (8, 9) are enclosed in microcapsules (7) and incorporated in a binder (6), the microcapsules (7) being brought by a swelling agent into a swollen state in which the particles (8, 9) are supported movably in the microcapsules (7), thereby bringing the optically changeable material (*M*) into an activated state.

24. A method according to claim 23, characterized in that the security layer (2) and/or information (3) is produced on the security document (1) by means of an already activated optically changeable material (*M*).

25. A method according to claim 23, characterized in that the security layer and/or information is produced on the security document by means of a nonactivated optically changeable material, and the security document is treated with a swelling agent to activate the optically changeable material.

26. A method according to claim 23, characterized in that the security layer and/or information is produced on the security document by means of a material including the nonactivated optically changeable material and microcapsules containing the swelling agent required for activation, and activation of the optically changeable material on the document is effected by destroying the microcapsules with the swelling agent.

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27. A test method for testing a security document according to any of claims 1 to 17, characterized in that the security document (1) is exposed to an electric field ( $E$ ) or magnetic field.

28. A test method according to claim 27, characterized in that an external electric or magnetic field is used.

29. A test method according to claim 27, characterized in that for producing the electric field, electrically conductive layers located in the security document are connected to a voltage source.

30. A test method according to any of claims 27 to 29, characterized in that the electric or magnetic field is structured.